

Listing of Claims

Please amend the claims as follows. This listing of claims will replace all prior versions and listings of claims in the application:

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Claims

1. – 47. (Canceled)

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48. (New) An electroluminescent device comprising in combination: (i) a first electrode; (ii) a layer of a first electroluminescent metal complex or organometallic complex; (iii) a layer of a second electroluminescent metal complex or organometallic complex; and (iv) a second electrode, wherein the band gap of the second electroluminescent metal complex or organometallic complex is larger than the band gap of the first electroluminescent metal complex or organometallic complex.

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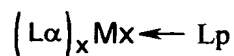
49. (New) An electroluminescent device according to claim 48 wherein the metal in the first and second electroluminescent metal complex or organometallic complex is selected from the group consisting of Sm(III), Eu(II), Eu(III), Tb(III), Dy(III), Yb(III), Lu(III), Gd(III), U(III), U(VI)O₂, Tm(III), Th(IV), Ce(III), Ce(IV), Pr(III), Nd(III), Pm(III), Dy(III), Ho(III), and Er(III).

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50. (New) An electroluminescent device according to claim 48 wherein the metal in the first electroluminescent metal complex or organometallic complex is europium or

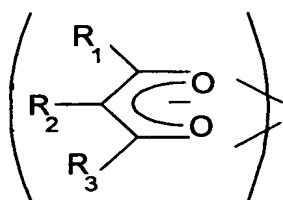
terbium, and the metal in the second electroluminescent metal complex or organometallic complex is gadolinium or cerium.

51. (New) An electroluminescent device according to claim 48 wherein the metal complexes or organometallic complexes have the general chemical formula

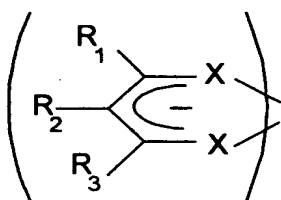


where Mx is the metal, x is the valence state of Mx; L α and Lp are organic ligands, further wherein Lp is a neutral ligand; the ligands L α can be the same or different, and there can also be a plurality of ligands Lp which can be the same or different.

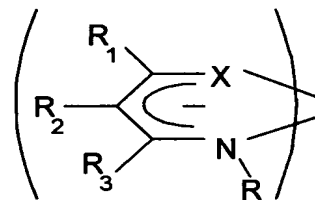
52. (New) An electroluminescent device according to claim 51 wherein L α is selected from compounds having a general chemical formula selected from (I), (II) and (III) below:



(I)



(II)

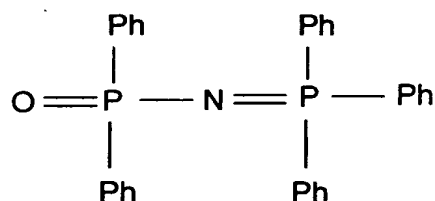


(III)

where R₁, R₂ and R₃ can be the same or different and are independently selected from hydrogen, substituted and unsubstituted hydrocarbyl groups, substituted and unsubstituted aliphatic groups, substituted and unsubstituted aromatic, heterocyclic and polycyclic ring

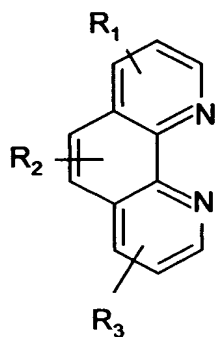
structures, fluorocarbons, halogens, fluorine and thiophenyl groups; R_1 , R_2 and R_3 can also form substituted and unsubstituted fused aromatic, heterocyclic and polycyclic ring structures, and they can be copolymerisable with a monomer; X is selected from Se, S and O; and Y is selected from hydrogen, substituted or unsubstituted hydrocarbyl groups, substituted and unsubstituted aromatic, heterocyclic and polycyclic ring structures, fluorine, fluorocarbons, trifluoromethyl groups, halogens, thiophenyl groups, nitrile groups, tripyridyl and TMHD groups, TMHD complexes, and α , α' , α'' tripyridyl.

53. (New) An electroluminescent device according to claim 51 wherein the groups L_p are selected from compounds having the general chemical formula:



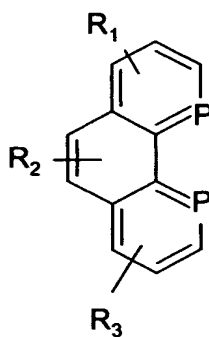
(XVIII)

where each Ph which can be the same or different and is selected from phenyl (OPNP) groups, substituted phenyl groups, other substituted or unsubstituted aromatic groups, substituted or unsubstituted heterocyclic or polycyclic groups, substituted or unsubstituted fused aromatic groups, naphthyl groups, anthracene groups, phenanthrene groups, pyrene groups, and compounds having a general chemical formula selected from one of the following:



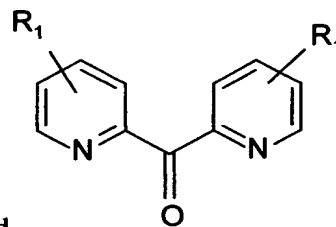
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and



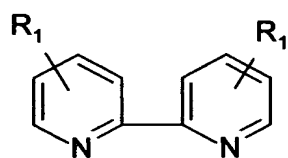
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and

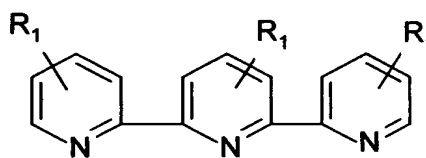


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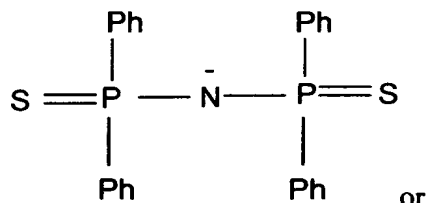
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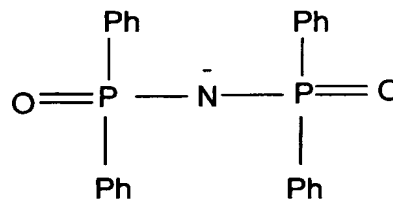


(XXIII)



(XXIV)

or



(XXV)

- 10 where Ph is as above and where R₁, R₂ and R₃ can be the same or different and are independently selected from hydrogen, substituted and unsubstituted hydrocarbyl groups, substituted and unsubstituted aliphatic groups, substituted and unsubstituted aromatic, heterocyclic and polycyclic ring structures, fluorocarbons, halogens, fluorine and thiophenyl

groups; R_1 , R_2 and R_3 can also form substituted and unsubstituted fused aromatic, heterocyclic and polycyclic ring structures, and they can be copolymerisable with a monomer; and also be selected from crown ethers; cyclans; cryptans; phthalocyanans; porphoryins; ethylene diamine tetramine (EDTA); DCTA; DTPA and TTHA.

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54. (New) An electroluminescent device according to claim 52 wherein the metal in the complex is europium and the complex is $\text{Eu}(\text{DBM})_3\text{OPNP}$.

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55. (New) An electroluminescent device according to claim 52 wherein the metal in the complex is gadolinium and the complex is $\text{Gd}(\text{DBM})_3\text{Phen}$.

56. (New) An electroluminescent device according to claim 48 wherein there is a layer of a hole transmitting material positioned between the first electrode and an electroluminescent layer.

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57. (New) An electroluminescent device according to claim 56 wherein the hole transmitting material is selected from the group consisting of aromatic amine complexes, conjugated polymers, and films of a polymer selected from poly(vinylcarbazole), $\text{N,N}'$ -diphenyl- $\text{N,N}'$ -bis (3-methylphenyl) -1,1' -biphenyl -4,4'-diamine (TPD), polyaniline, substituted polyanilines, polythiophenes, substituted polythiophenes, polysilanes and substituted polysilanes, a polymer of a cyclic aromatic compound, poly (p-phenylenevinylene)-PPV, copolymers of PPV, poly(2,5 dialkoxyphenylene vinylene), poly

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(2-methoxy-5-(2-methoxypentyloxy-1,4-phenylene vinylene), poly(2-methoxypentyloxy)-1,4-phenylenevinylene), poly(2-methoxy-5-(2-dodecyloxy-1,4-phenylenevinylene) and other poly(2,5 dialkoxyphenylenevinylenes) with at least one of the alkoxy groups being a long chain solubilising alkoxy group, poly fluorenes, oligofluorenes, polyphenylenes,
5 oligophenylenes, polyanthracenes, oligo anthracenes, polythiophenes and oligothiophenes.

58. (New) An electroluminescent device according to claim 48 wherein there is a layer of an electron transmitting material positioned between an electroluminescent compound layer and the second electrode.

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59. (New) An electroluminescent device according to claim 58 wherein the electron transmitting material is selected from metal quinolates, cyano anthracenes, aluminium quinolate and lithium quinolate.

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60. (New) An electroluminescent device according to claim 49 wherein the metal in the second electrode is selected from aluminium, calcium, lithium, and silver/magnesium alloys.

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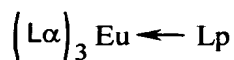
61. (New) An electroluminescent device comprising in combination: (i) a first electrode; (ii) a layer of an electroluminescent europium metal complex or organometallic complex mixed with an iridium metal complex or organometallic complex; and (iii) a second electrode.

62. (New) An electroluminescent device according to claim 61 wherein there is a layer of an electroluminescent europium metal complex or organometallic complex positioned between the first electrode and the layer of an electroluminescent europium metal complex or organometallic complex mixed with an iridium metal complex or organometallic complex.

63. (New) An electroluminescent device according to claim 61 wherein there is a layer of an electroluminescent europium metal complex or organometallic complex positioned between the layer of an electroluminescent europium metal complex or organometallic complex mixed with an iridium metal complex or organometallic complex and the second electrode.

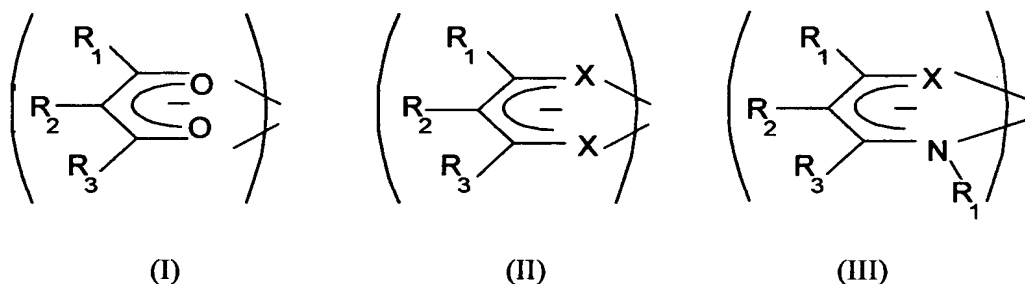
64. (New) An electroluminescent device according to claim 61 wherein the europium metal complex or organometallic complex has the general chemical formula $(L\alpha)_3Eu$, where $L\alpha$ is an organic complex.

65. (New) An electroluminescent device according to claim 64 wherein the europium metal complex or organometallic complex has the general chemical formula



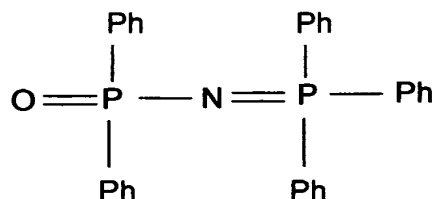
where $L\alpha$ and Lp are organic ligands with Lp being a neutral ligand, the ligands $L\alpha$ can be the same or different, and there can also be a plurality of ligands Lp which can be the same or different.

- 5 66. (New) An electroluminescent device according to claim 64 wherein $L\alpha$ is selected from compounds having a general chemical formula selected from (I), (II) and (III) below:



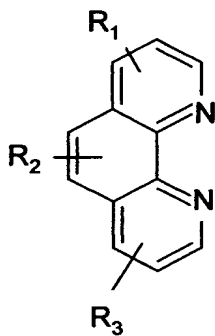
- 10 where R_1 , R_2 and R_3 can be the same or different and are independently selected from hydrogen, substituted and unsubstituted hydrocarbyl groups, substituted and unsubstituted aliphatic groups, substituted and unsubstituted aromatic, heterocyclic and polycyclic ring structures, fluorocarbons, halogens, fluorine and thiophenyl groups; R_1 , R_2 and R_3 can also
- 15 form substituted and unsubstituted fused aromatic, heterocyclic and polycyclic ring structures, and they can be copolymerisable with a monomer; X is selected from Se, S and O; and Y is selected from hydrogen, substituted or unsubstituted hydrocarbyl groups, substituted and unsubstituted aromatic, heterocyclic and polycyclic ring structures, fluorine, fluorocarbons, trifluoromethyl groups, halogens, thiophenyl groups, nitrile groups, tripyridyl
- 20 and TMHD groups, TMHD complexes, and α , α' , α'' tripyridyl.

67. (New) An electroluminescent device according to claim 65 wherein the groups L_P are selected from compounds having the general chemical formula:



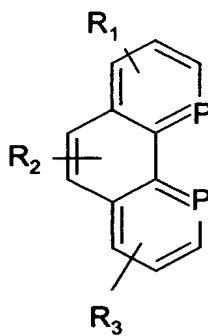
(XVIII)

where each Ph which can be the same or different and is selected from phenyl (OPNP) groups, substituted phenyl groups, other substituted or unsubstituted aromatic groups, substituted or unsubstituted heterocyclic or polycyclic groups, substituted or unsubstituted fused aromatic groups, naphthyl groups, anthracene groups, phenanthrene groups, pyrene groups, and compounds having a general chemical formula selected from one of the following:



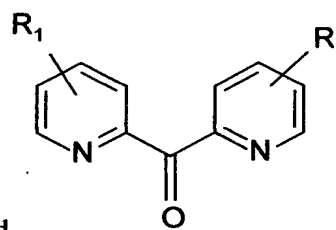
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and



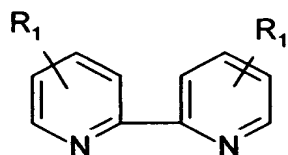
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and

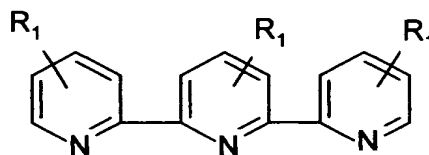


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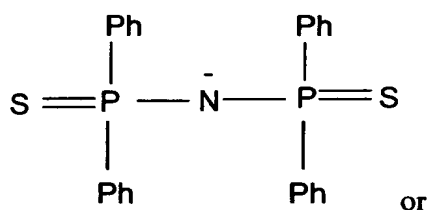
and



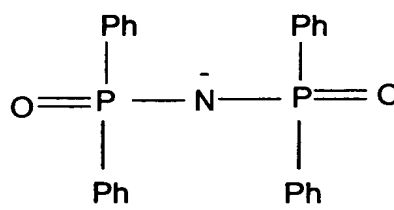
(XXII)



(XXIII)



(XXIV)



(XXV)

where Ph is as above and where R_1 , R_2 and R_3 can be the same or different and are independently selected from hydrogen, substituted and unsubstituted hydrocarbyl groups, substituted and unsubstituted aliphatic groups, substituted and unsubstituted aromatic, heterocyclic and polycyclic ring structures, fluorocarbons, halogens, fluorine and thiophenyl groups; R_1 , R_2 and R_3 can also form substituted and unsubstituted fused aromatic, heterocyclic and polycyclic ring structures, and they can be copolymerisable with a monomer; and also be selected from crown ethers; cyclans; cryptans; phthalocyanans; porphoryins; ethylene diamine tetramine (EDTA); DCTA; DTPA and TTHA.

68. (New) An electroluminescent device according to claim 65 wherein the metal in the complex is europium and the complex is $\text{Eu}(\text{DBM})_3\text{OPNP}$.

69. (New) An electroluminescent device according to claim 60 wherein there is a layer of a hole transmitting material positioned between the first electrode and an electroluminescent layer.

5 70. (New) An electroluminescent device according to claim 69 wherein the hole transmitting material is selected from the group consisting of aromatic amine complexes, conjugated polymers, and films of a polymer selected from poly(vinylcarbazole), N,N'-diphenyl-N,N'-bis (3-methylphenyl) -1,1' -biphenyl -4,4'-diamine (TPD), polyaniline, substituted polyanilines, polythiophenes, substituted polythiophenes, polysilanes and
10 substituted polysilanes, a polymer of a cyclic aromatic compound, poly (p-phenylenevinylene)-PPV, copolymers of PPV, poly(2,5 dialkoxyphenylene vinylene), poly(2-methoxy-5-(2-methoxypentyloxy-1,4-phenylene vinylene), poly(2-methoxypentyloxy)-1,4-phenylenevinylene), poly(2-methoxy-5-(2-dodecyloxy-1,4-phenylenevinylene) and other
15 poly(2,5 dialkoxyphenylenevinylenes) with at least one of the alkoxy groups being a long chain solubilising alkoxy group, poly fluorenes, oligofluorenes, polyphenylenes, oligophenylenes, polyanthracenes, oligo anthracenes, polythiophenes and oligothiophenes

71. (New) An electroluminescent device according to claim 60 wherein there is a layer of an electron transmitting material positioned between an electroluminescent
20 compound layer and the second electrode.

72. (New) An electroluminescent device according to claim 71 wherein the electron transmitting material is selected from metal quinolates, cyano anthracenes, aluminium quinolate and lithium quinolate.

5 73. (New) An electroluminescent device according to claim 60 wherein the metal in the second electrode is selected from aluminium, calcium, lithium, and silver/magnesium alloys.

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